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UNDERSTANDING VIRTUAL EXPERIENCE AND TELEPRESENCE - A REVIEW AND SYNTHESIS OF LITERATURE

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Abstract

To enable buyers to be better informed before purchasing, products and services can be virtually experienced on the internet. Research into virtual experience (VE) and the related construct of telepresence (TP) as means of online marketing has made great progress in recent years. However, there is still disagreement in the literature concerning the exact understanding of these terms. In this study, the two terms are analyzed by means of a systematically executed literature review, differentiated from one another, and their understandings explained. This study is to our knowledge the first to compare the concepts of VE and TP in a systematic way. The analysis shows that TP is regarded as the feeling of presence conveyed by a communication medium. VE, on the other hand, is to be defined as an active state of a consumer through the use of computer-based presentation formats, and constituting a subtype of TP. These findings are intended to help VE and TP become more uniformly understood and make it easier to compare the results of future studies. Finally, from the literature review, it is possible to derive focal points for research in future studies.

Keywords: Virtual experience, Telepresence, Literature review, Construct definition.

1 Introduction

The evaluation of relevant properties of goods and services is essential for an informed buying decision. The direct assessment of such features often turns out to be difficult and expensive (Alba et al., 1997; Bei et al., 2004). One main reason for this is that certain features can only be evaluated after the purchase (e.g. the taste of an apple) or only with disproportionate expense (e.g. the chemical ingredients in foodstuffs) (Nelson, 1970). On the internet, however, it is possible to experience products and services virtually, even before the purchase, on the basis of visual presentations (Jiang and Benbasat, 2005; 2007a). In this way consumers are provided with additional information that enables them to assess certain features of the product or service before purchase, and therefore to reduce the purchase risk (Appiah, 2006; Ha, 2005; Park et al., 2005; Ratchford et al., 2001).

With regard to the communication of properties of products and services, particular attention is to be paid to virtual experience (VE) and also to telepresence (TP) which has an important role to play in VE (e.g. Jiang and Benbasat, 2007b; Keng and Lin, 2006; Klein, 2003; Li et al., 2002; Schneider, 2006). Though, different understandings of the terms VE and TP exist in the literature. Until now, neither have the concepts of VE and TP been clearly differentiated from one another, nor has there been any agreement on their proper understanding. Just a few examples to demonstrate these problems: Keng and Lin (2006) understand TP to mean what Li et al. (2001) understand by VE; unlike Li et al. (2003), Cho et al. (2002) do not limit VE to experience of products or services in a three-dimensional environment, but specify only a computer-based environment as a condition; Schneider (2006) in turn uses the term presence as an abbreviation for TP, but the term presence, however, is normally used to describe the feeling of being in a real environment (Steuer, 1992). Because of such differences in the understanding of the terms, it is very difficult to compare the research results of different studies. For future complementary research studies, clear definitions of VE and TP are key requirements. This study is therefore intended to answer the question as to how the terms VE and TP are to be understood in the context of online communication concerning products and services.

On the basis of a systematic literature review, it is possible to create an overview of the various understandings of the terms VE and TP, so that these may then be clearly differentiated from one another and uniquely defined. The literature review is structured as proposed by Webster & Watson (2002). In the following section, first the two key constructs VE and TP are introduced. Then the literature search process is described and the review's results based on a concept-centric approach are presented. This is followed by the discussion of the results. An attempt is made here to explain systematically the terms VE and TP. After the discussion of limitations, the study concludes with a summary of theoretical contributions and an outlook of future research in the field of VE and TP.

2 Basic Concepts

VE and TP are the research objects to be investigated. By describing them, the area of investigation for the literature review can be outlined more precisely in terms of topics. In addition, further definitions which are indicated by the literature review can be compared with these definitions of the terms. VE and TP are described below on the basis of established definitions from the literature.

2.1 Virtual Experience

A frequently used definition of VE comes from Li et al. (2001). They state that VE means vivid, involving, active, and affective psychological states occurring in an individual interacting with three-dimensional computer simulations. According to this definition, VE is generated by three-dimensional (3D) presentation formats, which permit products (no mention is made of services) to be structured and clearly presented on the internet (Herstell, 2008). As well as the visual and auditory senses, these

can also appeal to the sense of touch since it is usually possible for the functioning of products to be tried out and the object itself to be virtually touched using the computer mouse (Li et al., 2001; Suh and Lee, 2005). The control which a consumer has through the interactions with the presentation format is the main similarity between a direct experience and a VE (Daugherty et al., 2008; Hyun et al., 2009). Thus the virtual presentation is not a mere representation of the product or service, but rather a simulation of it (Li et al., 2001). Therefore VE, like direct experience, is superior to indirect experience (Daugherty et al., 2008; Li et al., 2002). Since a third source stands between the consumer and the purchase object in the VE and the indirect experience, a VE may also be regarded as a form of indirect experience (Heeter, 2000). In the VE the consumer physically sits in front of the computer and feels that he has been placed in a virtual location in which the product or service is conveyed (Shih, 1998). This aspect, which is central for VE, is described by the concept of TP.

2.2 Telepresence

Steuer (1992) understands TP as being the experience of presence in an environment by means of a communication medium. In the online information process, the individual is situated, for example, in front of a computer (presence), but feels that he has been placed in an environment conveyed by the computer (telepresence). A certain degree of fantasy and imagination is required in order to achieve this (Shih, 1998). There are basically two technological determinants of TP: vividness and interactivity (Steuer, 1992). Vividness is defined as a technical aspect which signifies the possibility of transferring information via several parallel channels. Examples of such a channel are graphics, sound, voice, expressions or gestures (Fiedler and Gallenkamp, 2008). Interactivity is defined by Steuer (1992) as the extent to which an individual can modify the form and content of a communicated environment in real time. An interaction may, for example, be the manipulation of a virtual object, as well as the navigation through a virtual space (Herstell, 2008). Thus the communication system should give feedback immediately in response to the actions of the user, by triggering a response in the virtual environment (Shih, 1998).

3 Literature Review

The literature review is based on the scheme of vom Brocke et al. (2009): 1) Journal selection, 2) Database search, 3) Keyword search, 4) Literature evaluation.

1) Journal selection: The investigation was to take into account articles from journals from the fields of information systems (IS), marketing and business administration (BA). In a first stage, journals contained in the VHB JOURQUAL 2 ranking 2008 and ranked between A+ and C were selected (Schrader and Hennig-Thurau, 2009). This enabled 54 relevant journals to be identified. To prevent journals that are also relevant from being overlooked, the sources of the relevant articles from the first 54 articles are identified in a second stage by means of "go-backward-processes" (Webster and Watson, 2002). This meant that nine additional journals that were not contained in the VHB ranking were searched for suitable articles. All editions of journals published in the period from January 1992 to April 2010 were considered. The journals included are listed in Table 1.

2) Database search: Relevant articles were searched for in a total of 63 different journals by entering keywords in a database. EBSCO Business Source Premier was used as the main database. With 33 journals, it was possible for over half of all selected journals to have their content searched by means of this database. Journals which were not to be found in the EBSCO database were searched for via alternative databases. These were ACM Portal, Emerald, Inter Science, Springer Link, SAGE and Science Direct. A few journals could not be found in any database. These were analysed directly on the relevant journal website.

3) Keyword search: First of all, articles were searched for in 20 different journals using a total of 27 keyword combinations. This showed that "virtual experience" and "telepresence" are sufficient for

finding the relevant articles. Therefore the journals were searched using the keywords "virtual experience" and "telepresence", which had to appear in the text of the article.

4) Literature evaluation: A total of 163 articles were found in the 63 journals considered. Articles considered to be relevant were those which studied the constructs of VE and TP in a general context or in the context of the communication of information relating to products or services. This means firstly that articles which are concerned with the definition of the constructs without considering them in a specific area of application, or articles which investigate TP or VE as a means of online marketing for communication were selected. Articles that studied the construct in another context, likewise virtual worlds, virtual communities or robotics, were excluded. The title and abstract were analysed first in each case. In cases of uncertainty, the contents were evaluated in a second stage. Table 1 shows, in brackets, how many relevant articles have been found in each journal. A total of 44 articles from 26 different journals were considered to be relevant and used for the literature review. The largest numbers of relevant articles are from journals from the field of marketing and from journals with VHB ranking B.

VHB	Area	Journals
A+ (5)	IS (1)	Information Systems Research (1)
	Marketing (4)	Journal of Consumer Research (2), Journal of Marketing (1), Journal of Marketing Research, Marketing Science (1)
	BA (0)	Academy of Management Journal, Academy of Management Review, Management Science
A (5)	IS (5)	MIS Quarterly (2), Journal of Management Information Systems (1), Proceedings of the International Conference on Information Systems (2)
	Marketing (0)	International Journal of Research in Marketing, Journal of Applied Psychology, Journal of Service Research, Journal of the Academy of Marketing Science
	BA (0)	Strategic Management Journal
B (14)	IS (1)	Information Systems Journal, International Journal of Electronic Commerce, Journal of Information Technology, Journal of Strategic Information Systems, Journal of the Association for Information Systems, Proceedings of the European Conference on Information Systems (1), Wirtschaftsinformatik
	Marketing (8)	Journal of Communication (1), Journal of Consumer Psychology (1), Journal of Interactive Marketing (4), Journal of International Marketing, Marketing Letters, Psychology and Marketing (2)
	BA (5)	Journal of Business, Journal of Business Research (5), Schmalenbach Business Review
C (9)	IS (1)	ACM Transactions on Computer-Human Interaction, Australasian Journal of Information Systems (1), Electronic Commerce Research, Electronic Commerce Research and Applications, Information Systems, Information Systems and E-Business Management, Information Systems Frontiers, International Journal of Information Management, Journal of Computer Mediated Communication
	Marketing (8)	Advances in Consumer Research (1), Advances in International Marketing, European Journal of Marketing (2), International Journal of Nonprofit and Voluntary Sector Marketing, International Marketing Review, Journal of Advertising (3), Journal of Advertising Research, Journal of Consumer Behavior (1), Journal of Marketing Theory and Practice, Journal of Service Management, Journal of Services Marketing, Journal of Strategic Marketing, Marketing Theroy (1)
none (11)	IS (3)	CyberPsychology and Behavior (2), Information Technology and Tourism (1)
	Marketing (6)	Journal of Current Issues and Research in Advertising (1), Journal of Fashion Marketing and Management (1), Journal of Interactive Advertising (2), Journal of Travel and Tourism Marketing (1), Journal of Vacation Marketing (1)
	BA (2)	International Journal of Tourism Research (1), Tourism Management (1)
Σ Articles total: 44	**Σ IS: 11**	**Σ Marketing: 26** **Σ BA: 7**

Table 1. Overview of journals.

The articles considered are listed in Table 2 alphabetically according to author's name. Of the 44 articles considered, nine were categorized as conceptual and 35 as empirical. Of the conceptual, non-empirical studies, other than a literature discussion by Chin and Swatman (2005), the majority were frameworks or propositions on the two constructs under investigation. The empirical studies rely mainly on quantitative methods. Apart from a few surveys, these are predominantly experimental

studies. Most articles examine VE or TP on the basis of products as examples. Only six articles focus on the two constructs from the service perspective. Wikström et al. (2002) regard the two perspectives as a single one. Six further studies incorporate neither a product nor a service perspective, but focus on the constructs in a general context. The majority of studies include products or services that have to be experienced to a certain extent. In articles relating to services, tourism offers are mainly used as examples of application. In the case of products, technical objects such as cameras, computers or clocks are often used as well as clothing. In the communication of properties of such technical products, their functionality plays an important role.

No.	Articles	Design	Context	No.	Articles	Design	Context
1	Bridges/Florsheim (2008)	emp	Product	23	Kim/Forsythe (2009)	emp	Product
2	Chin/Swatman (2005)	con	Product	24	Klein (2003)	emp	Product
3	Chiou et al. (2008)	emp	Service	25	Li et al. (2001)	emp	Product
4	Cho et al. (2002)	con	Service	26	Li et al. (2002)	emp	Product
5	Coyle/Thorson (2001)	emp	Product	27	Li et al. (2003)	emp	Product
6	Daugherty et al. (2008)	emp	Product	28	Mazursky/Vinitzky (2005)	emp	Product
7	Edwards/Gangadharbatla (2001)	emp	Product	29	Mollen/Wilson (2009)	con	General
8	Fiore et al. (2005)	emp	Product	30	Novak et al. (2000)	emp	General
9	Fortin/Dholakia (2005)	emp	Product	31	Park et al. (2005)	emp	Product
10	Griffith/Chen (2004)	emp	Product	32	Park et al. (2008)	emp	Product
11	Ha (2005)	emp	General	33	Schlosser (2003)	emp	Product
12	Hopkins et al. (2004)	emp	Product	34	Schlosser (2006)	emp	Product
13	Hyun et al. (2009)	con	Service	35	Schneider (2006)	con	Product
14	Jacob et al. (2010)	emp	Service	36	Shih (1998)	con	General
15	Jeong/Choi (2004)	emp	Service	37	Song et al. (2007)	emp	Product
16	Jiang/Benbasat (2003)	con	Product	38	Song/Zinkhan (2008)	emp	Product
17	Jiang/Benbasat (2005)	emp	Product	39	Steuer (1992)	con	General
18	Jiang/Benbasat (2007a)	emp	Product	40	Suh/Lee (2005)	emp	Product
19	Jiang/Benbasat (2007b)	emp	Product	41	Tomaseti et al. (2009)	emp	Product
20	Keng/Lin (2006)	emp	Product	42	Wan et al. (2007)	emp	Service
21	Khalifa/Shen (2007)	emp	Product	43	Waterworth/Waterworth (2001)	con	General
22	Kim/Forsythe (2008)	emp	Product	44	Wikström et al. (2002)	emp	Both

Table 2. Relevant articles (emp = empirical, con = conceptual).

4 Results

In order to create an overview of the various understandings of the terms VE and TP, the individual articles were searched according to their respective definitions. Cited definitions were traced back to their original author and article. In this way, it was possible to record all definitions on which the various understandings of the terms VE and TP are based.

A total of nine different definitions were found for the term VE. However, only three of these are cited in the articles under consideration. The definitions are listed in Table 3. The fourth column refers in each case to the articles in which the specified definition is cited. The numbers refer to the respective articles from Table 2. The oldest definition of VE developed by Li et al. (2001) is at the same time also the most frequently cited one. On the basis of the analysis of 30 qualitative interview records, it was possible to produce a detailed definition of VE which is cited in nine further articles by different authors. This definition has already been presented. The second-oldest definition, according to Cho et al. (2002), was used on only one further occasion by Hyun et al. (2009). The definition developed by Jiang and Benbasat (2005) was cited by the same authors in two further articles and was also used by Schneider (2006). All further definitions were not cited by others.

The different understandings of the terms may be roughly classified on the basis of objects which trigger a VE. These objects are marked bold in each definition. Like Li et al. (2001), other authors also describe VE as experience from the use of 3D formats. According to this understanding of the term, they are a necessary requirement for the creation of VE. The somewhat more general definitions

according to Cho et al. (2002), Jiang and Benbasat (2005) and Griffith and Chen (2004) base their understanding of the term VE on the medium of computers. According to them, a VE is created by using a computer-supported presentation format which, even though it incorporates 3D formats, theoretically also permits 2D formats. VE is defined in quite specific terms in the still relatively recent definitions according to Wan et al. (2007) and Chiou et al. (2008). They regard VE as being present explicitly in different presentation formats such as panoramas, animations or interactive images. This version, although not directly cited, is also shared by other authors (Hyun et al., 2009; Wikström et al., 2002). A second classification option is provided by the definition context. Most definitions of VE are geared to the experience of products which is also called virtual product experience (Jiang and Benbasat, 2003; 2005; 2007a; Klein, 2003; Schneider, 2006). Chiou et al. (2008), Cho et al. (2002), and Wan et al. (2007) understand VE in a more general context. Even though all three articles investigate VE in the area of tourism, a service sector, none of them defines VE explicitly in the context of a service. What is striking is that most definitions according to which VE is created through 3D formats are based mainly on product experiences. Although Li et al. (2001) define VE in general they solely conducted studies in a product context (Daugherty et al., 2008; Li et al., 2002; 2003). All other more general definitions, on the other hand, focus less heavily on the product background.

Definition of VE	Σ	Articles	Format			Context	
			3D	com-puter	specific format	product	general
Li et al. (2001): "(...) consists of vivid, involving, active, and affective psychological states occurring in an individual interacting with **three-dimensional** computer simulations." p. 27.	9	6,7,15,18, 20,21,24, 26,27,31	x				x
Cho et al. (2002): "(...) an experience in a virtual environment using a **computer-mediated** environment and is based upon the concept of "telepresence"." p. 3.	1	13		x			x
Jiang and Benbasat (2003): "(...) employ **virtual reality** technology to simulate direct product experience." p. 961.	0	-	x			x	
Griffith and Chen (2004): "(...) the conveyance of experiential product attributes in an **on-line** simulation of a direct experience." p. 56.	0	-		x		x	
Jiang and Benbasat (2005): "(...) to enable **online** consumers to sample and experience products virtually, via Web interfaces." p. 112.	3	17,18, 35		x		x	
Suh and Lee (2005): "Consumers experience products (...) with virtual representations of the products, such as by using **virtual reality** (i.e., virtual experience)." p. 678.	0	-	x			x	
Wan et al. (2007): "Virtual experience, such as **panoramic views, animation, and interactive photos**, (...)." p. 46.	0	-			x		x
Chiou et al. (2008): "(...) virtual experience, such as **panoramic views, animation, and interactive photos**, so that consumers can get a direct experience without actually being there." p. 146.	0	-			x		x
Park et al. (2008): "(...) a special type of indirect experience where product encounters are simulated through the use of technological enhancements such as rotation, zoom, or contextualization to create the sense of a **three-dimensional (3-D)** presentation." p. 73.	0	-	x			x	

Table 3. Definitions of virtual experience.

As Table 4 shows, seven different definitions of TP exist in the articles which were considered. The concept of TP appears to be somewhat older than the concept of VE. The oldest recorded definition comes from Minsky (1980). It predates the first definition of VE by a good 20 years. The second-oldest is the definition by Steuer (1992), already presented. This was cited in 17 further articles. All other definitions were used in only one or two further articles in each case. One exception is the definition of the term according to Mollen and Wilson (2009), which is the most recent and has not been cited as yet. The definitions of TP can also be classified on the basis of their reference objects. In this case the reference objects do not consist of presentation formats, but of more or less concrete technologies which can trigger TP. Definitions such as those by Minsky (1980), IJsselsteijn et al. (2000) and Lombard and Snyder-Duch (2001) therefore refer to technologies in general. Steuer (1992) defines TP on the basis of communication mediums. According to the two most recent definitions by

Wan et al. (2007) and Mollen and Wilson (2009), TP is a feature of computer-based environments. Shih (1998) does not attach TP to a technology but rather to an abstract notion of virtual space.

Definition of TP	Σ	Articles	Technology			
			general	comm. medium	com-puter	virtual space
Minsky (1980): "To convey the idea of these remote **control tools**, scientists often use the words teleoperator or telefactor. I prefer to call this telepresence (...)." p. 1.	1	8	x			
Steuer (1992): "(...) the experience of presence in an environment by means of a **communication medium**." p. 76.	17	6,7,14,15,16,18,20, 21,22,26,27,28,32, 33,40,42,43		x		
Shih (1998): "(...) the extent to which consumers feel their existence in the **virtual space**." p. 658.	1	37				x
IJsselsteijn et al. (2000): "(...) a human operator develops a sense of being physically present at a remote location through interaction with the system's human interface, i.e. through the user's actions and the subsequent perceptual feedback he/she receives via the appropriate **teleoperation technology**." p. 3959.	1	21	x			
Lombard and Snyder-Duch (2001): "(...) a psychological state or subjective perception in which even though part or all of an individual's current experience is generated by and/or filtered through **human-made technology**, part or all of the individual's perception fails to accurately acknowledge the role of the technology in the experience." p. 58.	2	24,37	x			
Wan et al. (2007): "(...) telepresence, a sense of presence in a remote **computer-mediated** environment (...)." p. 45.	0	-			x	
Mollen and Wilson (2009): " (...) psychological state of 'being there' in a **computer-mediated** environment, augmented by focused attention." p. 921.	0	-			x	

Table 4. Definitions of telepresence.

In most definitions, TP is based on the notion of presence. Steuer (1992) understands presence as the feeling of being in a space which occurs through the direct perception of a real environment. TP, on the other hand, is created on the basis of a perceived environment communicated by media (Coyle and Thorson, 2001; Steuer, 1992). The term presence is often used instead of TP in the articles under consideration. Whilst several authors explicitly mention that they understand the terms TP and presence synonymously (Fiore et al., 2005; Lombard and Snyder-Duch, 2001; Shih, 1998), other authors use the expression presence even though the definition in these articles indicates that they are actually talking about TP (Li et al., 2001; 2002; Park et al., 2005; Wikström et al., 2002).

As already described in the introduction, the terminologies of VE and TP are also intermingled. For example, Keng and Lin (2006) define TP on the basis of the definition of VE according to Li et al. (2001). Since the authors do not indicate that they understand TP and VE to mean the same thing, in this case it must be a matter of the terms simply being interchanged. Hyun et al. (2009) likewise use the two constructs without differentiation. They describe a mapping which indicates the characteristics of interactivity and vividness, the technological determinants of TP, as "expanded typology of virtual experience (adapted from Steuer, 1992)". Jiang and Benbasat (2007b), on the other hand, quite consciously describe VE and TP as surrogates. They argue that a VE, as a result of its similarity to a direct product experience, can also be described as TP. Klein (2003) differentiates this understanding more precisely. She maintains that, as the TP of a medium increases, the experience thereby conveyed, e.g. a VE, becomes increasingly similar to the direct experience, since the observer increasingly forgets the medium (Klein, 2003; Lombard and Ditton, 1997). Whilst some regard TP as being a requirement for VE (Keng and Lin, 2006; Tomaseti et al., 2009; Wan et al., 2007; Waterworth and Waterworth, 2001), as proposed in the definition by Cho et al. (2002), others understand TP as being a mediator of VE (Li et al., 2001; 2002). The exact points of convergence between the two terms and the way in which they may be distinguished from one another are discussed in the next section.

5 Discussion

First of all, the nature of VE for products and services is explained. In order to achieve a VE (Li et al., 2001), the consumer requires two types of control over the objects presented: functional and visual control (Jiang and Benbasat, 2005). Functional control enables a consumer to try out the various functions of an object communicated by the computer. The virtual responses of the object correspond to the respective actual responses in reality. Visual control enables the consumer to manipulate the view of the object. By moving, zooming or rotating the user can observe it from different viewing angles and distances. Whilst the visual control shows what an object looks like, the functional control shows how it works. With regard to the VE of products the frequently cited definition according to Li et al. (2001) appears to be the most suitable. It describes precisely what is to be understood by experience and bases the understanding of the term on 3D formats. Besides visual controls, 3D formats also may permit functional controls in which objects can be touched and tried out using the computer mouse (Li et al., 2001; Suh and Lee, 2005). The concept of virtual product experience as defined by Li et al. (2001) could therefore be used in future research projects for most products. The limitation of VE to experiences communicated through 3D formats is however inadequate for services and also for products dominated by experience attributes. It must be assumed that visual control is of primary relevance for services and experience products. Physical components like the service environment or the design of a product may still be observed (visual control), but these do not usually respond directly to the actions of a consumer (functional control). In other words, there is no physical object with functions that can be tried out, for example by pressing buttons. Nevertheless visual control may be available when pictures can be selected and enlarged, videos can be winded forwards and backwards or panoramas can be zoomed or rotated. Since such 2D formats permit visual control, services and experience products can also be experienced on the basis of these display formats. The understanding of the term VE in the case of services and experience products thus corresponds to those definitions by Cho et al. (2002), Griffith and Chen (2004) and Jiang and Benbasat (2005) which consider computer-based formats to be a requirement for VE. The definitions by Chiou et al. (2008) and Wan et al. (2007) give concrete examples for such computer-based formats. In this case, the term *virtual* refers to computer-based presentation formats. If it referred solely to 3D formats due to their lack of functional features, services and experience products could not be experienced virtually. Concerning their general context the definitions developed by Li et al. (2001) and Cho et al. (2002) may best be adapted for a broader definition of VE: *Virtual experience can be understood as a vivid, involving, active, and affective psychological state that consumers encounter when interacting with computer-mediated presentation formats which depict products or services.* Experience as a psychological state refers to cognitive information processes (Li et al., 2001; Suh and Lee, 2005). The four determinants vividness (vivid), involvement (involving), interactivity (active and interacting) and affect (affective) describe how information is processed. They are also related to flow (Hoffman and Novak, 1996; Novak et al., 2000) and arousal (Fortin and Dholakia, 2005; Khalifa and Shen 2007). Furthermore interactivity refers to functional or visual control as a main condition for VE. However, interactivity and vividness are also determinants of TP.

The understanding of TP is defined somewhat more broadly. The much cited definition by Steuer (1992) appears to be the most appropriate: *Telepresence is the experience of presence in an environment by means of a communication medium.* It does not postulate any specific technology for TP, merely a communication medium sufficient for the purposes of communicating information. The definitions by Wan et al. (2007) or Mollen and Wilson (2009), which regard TP as existing only through computer-based technologies, fall short. In contrast to VE, TP may also be experienced independently of any computer-based technology. In its broadest sense, a book may also be seen as a communication medium which can convey TP, likewise a telephone or a television (Steuer, 1992). A computer-based presentation format required for a VE is another example for a concrete communication medium. Thus this understanding includes 3D formats as well as 2D formats and can be applied for any type of products or services. Therefore an aggregated definition for TP is not

needed. Alongside this technical component, the definition of TP also has a psychological one: the feeling of presence in a non-physical space. According to Lombard and Snyder-Duch (2001) and Mollen and Wilson (2007) this feeling of presence equates to the psychological state described by Li et al. (2001). Without the feeling of presence, neither a product nor a service can be virtually experienced (Li et al., 2001; Park et al., 2008). In this sense TP may be understood as a necessary condition for VE. However, the synonymous use of the two terms by a number of authors makes it clear that VE and TP has to be linked closer. Some authors have stated that TP is a VE (Hyun et al., 2009; Jiang and Benbasat, 2007b; Schloerb, 1995). This understanding may be explained as follows: VE is created via the feeling of presence through the presentation of products or services by means of computer-based presentation formats (Park et al., 2005). The computer-based presentation formats each have a certain degree of TP. The higher the TP turns out to be, the more realistic is the VE (Klein, 2003). There exists only one difference between the two terms. Whilst TP can be created by any communication medium, VE can only result from a computer-based presentation format which is a type of a communication medium. This understanding of VE refers to the definitions of TP developed by Wan et al. (2007) and Mollen and Wilson (2009). Thus, with regard to computer-based presentation formats, TP is not only a condition for VE but a VE itself. Therefore VE is to be understood as a subtype of TP.

5.1 Limitations

The findings are subject to some limitations. For example the literature review is not completely exhaustive. It is possible that further relevant articles have been published in journals or conference proceedings that were not included in the study. Indeed, no account was taken of books, book contributions or dissertations. However, the VHB rankings were used in an attempt to include as many high-quality publication media in the study as possible. Because of the different search algorithms used on the databases and the manual searches for articles on journal websites, it is also conceivable that other relevant articles might have been missed. This limitation was deliberately accepted, since otherwise it would have been necessary to restrict the literature search to one database which would have considerably reduced the source of data. Furthermore, the terms VE and TP were considered in the specific context of the communication of properties of products and services. The definitions and implications therefore apply primarily for this area. The use of the terms in other research areas such as psychology or robotics does not necessarily correspond to the one proposed here. In such areas the understanding of the term needs to be adapted again to the relevant context.

5.2 Conclusion and Future Research

This study is to our knowledge the first one that systematically examines the meanings of VE and TP used in literature. Its main contribution is the creation of a common understanding based on existing literature to avoid further undifferentiated use of the two constructs. The results insinuate that the focus in future studies should be placed on VE as a subtype of TP. In terms of computer-mediated presentation formats VE and TP can be used synonymously. Another insight concerns the definition of VE. It has also been proposed for the first time that a distinction should be drawn between VE of products and VE of services and experience products. Product or service attributes determine whether visual or functional control is needed for a VE. Functional control is limited only to 3D formats but visual control can be achieved by either 2D or 3D formats. Whilst the definition according to Li et al. (2001) refers only to 3D formats the broader definition proposed above includes 3D formats as well as 2D formats. The findings are ultimately intended to help achieve a uniform understanding of VE and TP and encourage the comparability of future study results.

As already mentioned, many studies in the area of research under consideration have a quantitative orientation. The comparative scarcity of qualitative and conceptual studies offers an interesting possibility for further research studies with reference to research design. For example, further conceptual studies into the determinants of VE would need to be carried out. Whilst TP is already

clearly described as a construct by the variables of interactivity and vividness, there is no concrete conceptualization of VE. Only a clear conceptualization of the construct of VE will enable concrete determinants to be defined and empirically substantiated, and VE to be made measurable. It is conceivable that possible determinants could be derived for this purpose from the definitions of VE adapted according to Li et al. (2001). The first part of this "(...) a vivid, involving, active, and affective psychological state (...)" shows that, alongside vividness (vivid) and interactivity (active), involvement (involving) and affect (affective) in particular could also be influencing factors.

Furthermore, as shown, VE and TP are considered in the literature mainly from the perspective of product marketing. The service perspective, on the other hand, appears to be still relatively unresearched in information systems studies. Services are dominated mainly by experience features (Nelson, 1970). The most information a customer receives about a service is therefore mainly through direct experience prior to the purchase. However, since this is only seldom possible, the information may alternatively be obtained through the simulation of the direct experience by means of VE. VE is therefore an important facility for communicating information about services, and should be considered in this context more often. As a result of such studies, it should ultimately be possible to show under what conditions the use of VE is feasible and effective as a means of communicating properties of products and services.

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